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Clarifying the occurrence and conservation status of *Plantago dielsiana* Pilg. and *P. australis* Lam. subsp. *pretoana* Rahn (Plantaginaceae) in Brazil

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Abstract: Problems in the original description of a species can have long-lasting consequences. This is the case of *Plantago dielsiana* and *P. australis* subsp. *pretoana*, two taxa referred to occur in Brazil by different authors. This work has the objective of clarifying the long-standing misunderstanding about the occurrence of these two taxa in Brazil. Additionally, we revise the distribution and assess the conservation status of *P. australis* subsp. *pretoana*, an endangered, rather poorly understood subspecies endemic to southeastern Brazil.

Key words: endemic species, distribution, Plantagineae, South America, taxonomy

Plantago L. is a cosmopolitan genus of approximately 250 species, concentrated in temperate and high elevation tropical regions (Rahn 1996; Rønsted et al. 2002; Hefler et al. 2011; Meudt 2012). *Plantago* species are anemophilous herbs or rarely subshrubs, perennial or annual (Rønsted et al. 2002; Meudt 2012). A few of these species are adapted to anthropic environments (ruderal species), as a result becoming widely distributed (like *P. major* L. and *P. lanceolata* L.), but most species have restricted distribution and occur in more specialised environments (Rahn 1996; Mohsenzadeh et al. 2010; Segarra and Wood 2011; Hassemer and Baumann 2014; Hassemer et al. 2014). Some *Plantago* species are endemic to small oceanic islands (Rahn 1996; Dunbar-Co et al. 2008; Meudt 2012). Because of its complex taxonomy (Ishikawa et al. 2009; Meudt 2011), it is not uncommon to find misidentified herbarium *Plantago* specimens, or even herbarium collections including specimens of different *Plantago* species. More drastic, however, is when such problems occur in the original description of a species: this is the case of *P. dielsiana* Pilg. (Pilger 1928).

Depending on the author, either *Plantago dielsiana* or *P. australis* Lam. subsp. *pretoana* Rahn (Rahn 1964) is referred to occur in Brazil (Pilger 1928, 1937; Rahn 1964, 1974; Souza 2010; Kaehler 2014). A thorough literature review reveals a complicated taxonomic situation: in his description of *P. australis* subsp. *pretoana*, Rahn (1964) elected as holotype one of the paratypes of *P. dielsiana* [*A.F.M. Glaziou 8897*, C]. This taxonomic incident is here shown to be the cause of a long-standing misunderstanding about these two taxa.

To clarify the taxonomic situation and the distribution of these two taxa we revised the entire *Plantago* collections at herbaria C, EFC, FLOR, HBR, ICN, MBM and UPCB, and loan collections from RB. Additionally, we examined high-resolution images of collections from herbaria G, K, R, S and US.

The revision of the materials from RB (nine collections originating from Serra do Itatiaia, southeastern Brazil, all previously identified as *Plantago dielsiana*) showed that these belong to *P. australis* subsp. *pretoana*. We thus agree with Rahn (1964, 1974), in that the two collections from Serra do Itatiaia [*P.K.H. Dusén 587* and *A.F.M. Glaziou 8897*] cited in the original description of *Plantago dielsiana* by Pilger (1928) belong to *P. australis* subsp. *pretoana*, and that only the type [*J.E. Gibert 968*] from Montevideo, Uruguay, belongs to *P. dielsiana*. The main morphological differences between these two taxa are presented in Table 1. Based on literature review (Pilger 1928, 1937; Rahn 1964, 1974, 1983, 1995; Souza 2010; Hefler et al. 2011; Hassemer and Baumann 2014; Hassemer et al. 2014) we recognise 17 species and subspecies of *Plantago* in Brazil (Table 2).

Plantago dielsiana (Figure 1) is a rather rare species, endemic to Pampean grasslands, restricted to southern Uruguay and eastern Buenos Aires province, eastern Argentina, at elevations no higher than 300 m above sea level (a.s.l.) (Rahn 1974, 1995). It does not occur in Brazil, and therefore should be removed from the "List

Table 1. Main morphological differences between *Plantago australis* subsp. *pretoana* and *P. dielsiana*.

	P. australis* subsp. *pretoana	***P. dielsiana***
Leaves	Rather thin; margin with inconspicuous teeth	Rather thick; margin with prominent teeth
Roots	No taproot; many cord-like roots	A thickened taproot, to 17 cm long
Caudex	A rhizome, 1–10 cm or longer	Rather inconspicuous, to 1 cm long
Bracts	Glabrescent	Ciliate
Ovary	2 ovules	1 ovule

of Species of the Flora of Brazil" (Souza and Hassemer 2015).

Plantago australis subsp. *pretoana* (Figure 2) is a much rarer subspecies, exclusive to two small, considerable distinct areas: high elevation rocky bogs in the highest areas of Serra do Itatiaia, southeastern Brazil, at 2,000–2,600 m a.s.l., and wet grasslands around Lagoa Dourada, in Ponta Grossa, Paraná state, southern Brazil, at 790–840 m a.s.l. With the examination of the collections cited by Rahn (1974) for the southern Brazilian states of Santa Catarina [*L.B. Smith et al. 7712*, HBR; see Figure 36 in Rahn 1974] and Rio Grande do Sul [*B. Rambo 51492*, HBR] we realised that these collections are certainly not of *P. australis* subsp. *pretoana*. These doubtful collections are being further investigated. The only two collections of this subspecies from Lagoa Dourada are from 1914 [*G. Jönsson 1160a*, G, S, US] and 1978 [*L.T. Dombrowski 9695*, MBM], and since then it was not collected there again, despite great collection efforts in the area, including fieldwork conducted there by GH in January 2015. Therefore, it is possible that this subspecies may be locally extinct in Paraná. The conservation status of *P. australis* subsp. *pretoana*, according to the IUCN criteria (IUCN 2012, 2014), is here assessed as Endangered (EN—B2a,b[iii]). It is necessary its inclusion in the "Red Book of the Flora of Brazil" (Martinelli and Moraes 2013).

Table 2. List of accepted *Plantago* species and subspecies in Brazil. Subgenera and sections follow Rahn (1996), updated by Rønsted et al. (2002). Non-native species are marked with an asterisk.

Subgenus *Coronopus* (Lam. & DC.) Rahn
- Section *Coronopus*
  - **Plantago coronopus* L.

Subgenus *Plantago*
- Section *Plantago*
  - **Plantago major* L.
- Section *Virginica* Barnéoud
  - *Plantago australis* Lam. subsp. *australis*
  - *Plantago australis* Lam. subsp. *pretoana* Rahn
  - *Plantago catharinea* Decne.
  - *Plantago commersoniana* Decne. ex Barnéoud
  - *Plantago corvensis* Hassemer
  - *Plantago guilleminiana* Decne.
  - *Plantago myosuros* Lam. subsp. *myosuros*
  - *Plantago penantha* Griseb.
  - *Plantago rahniana* Hassemer & R.Trevis.
  - *Plantago tomentosa* Lam. subsp. *napiformis* (Rahn) Rahn
  - *Plantago tomentosa* Lam. subsp. *tomentosa*
  - *Plantago trinitatis* Rahn
  - *Plantago turficola* Rahn

Subgenus *Psyllium* (Juss.) Harms & Reiche
- Section *Gnaphaloides* Barnéoud
  - *Plantago brasiliensis* Sims
- Section *Lanceifolia* Barnéoud
  - **Plantago lanceolata* L.

MATERIAL EXAMINED:

Plantago australis subsp. *pretoana*. BRAZIL. Minas Gerais: Bocaina de Minas: Itatiaia, an Tijuca près de la source du Rio Preto, 20 November 1876, *A.F.M. Glaziou 8897* (C, holotype, R). Paraná: Ponta Grossa: 23. Turma, locis uliginosis et humidis, 19 October 1914, *G. Jönsson 1160a* (G, S, US); Lagoa Dourada, campo, 17 August 1978, *L.T. Dombrowski 9695* (MBM). Rio de Janeiro: Itatiaia: Serra do Itatiaia, in campis humidis, 15 June 1902, *P.K.H. Dusén 587* (R); Serra da Mantiqueira, 2,300 m, 3 March 1931, *R.W. Kaempfe 417* (RB); Primeiro córrego, 28 December 1934, *R.K.F. Pilger 72* (RB); Pântanos no planalto, 2,300–2,400 m, 28 December 1934, *R.K.F. Pilger & A.C. Brade 105* (FLOR, RB); Ribeirão das Flores, 2,200 m, November 1938, *F. Markgraf & A.C. Brade 3725* (FLOR, RB); Planalto, km 20, 12 October 1945, *A.B. Pereira & Walter 107* (FLOR, RB); Planalto, lugar úmido, 2,300 m, 1 March 1950, *A.C. Brade 20241* (FLOR, RB); Prateleiras, 4 June 1975, *A.M. Camerik 100* (RB); Prateleiras, 25 June 1975, *A.M. Camerik 195* (RB); Parque Nacional do Itatiaia, estrada para o Pico das Agulhas Negras, paredões úmidos, 13 March 2010, *J.M. Silva & J. Cordeiro 7554* (MBM); *s.d.*, *A.C. Brade s.n.* (RB 62313).

Plantago dielsiana. ARGENTINA. Buenos Aires: Balcarce: Estancia El Volcán, en potrero de "Trebol Frutilla", 27 January 1960, *E. Nicora 6918* (C); Road from Mar del Plata to Balcarce, Puerta del Abra, between km 45 and 46, east side of the road, in short grass and in open ground by roadside fence, sandy soil, 37°53′ S, 058°03′ W, 3 April 1966, *J.G. Hawkes et al. 4038* (C); Mar Chiquita: Arroyo Los Cueros, N. of Cobo, by bridge (Ruta 2), in overtrodden places, 37°46′ S, 057°38′ W, 26 m, 12 December 1965, *J.G. Hawkes et al. 3030* (C); Mar del Plata: Plaza Gral. Pueyredon, 15 December 1964, *Okada 2092* (C). URUGUAY. Canelones: Arenares de Carrasco, January 1936, *A. Lombardo 4785* (C). Montevideo: in uliginosis, *s.d.*, *J.E. Gibert 968* (K, lectotype).

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cm
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MUSEUM BOTANICUM
C
HAVNIENSE
3030
12/12
Museum Botanicum Hauniense
PLANT COLLECTING EXPEDITION TO ARGENTINA
NOVEMBER 1965 TO APRIL 1966
Plantago australis Lam. ssp. Dielsiana
(Pilger) Rahn
det. K. Rahn. 1966
Prov. Buenos Aires, partido Mar Chiquita, A° los Cueros, N. of Cobo, by bridge (Ruta 2). Higher and dryer than No. 3029's "border of rivulet". Almost always in overtrodden places (paths)
* P. a. ssp. australis
Lat. 37° 46 ' S., Long. 57 ° 38 ' W., Alt. 26 m. Date 12.XII 1965
Leg. J. P. HJERTING & K. RAHN: no. 3030
University of Copenhagen
Un 02,204-43
Plantago dielsiana Pilg. Det. K Rahn, 1975
Museum Botanicum Hauniense

Figure 1. Scanned collection of *Plantago dielsiana* [*J.G. Hawkes et al. 3030*, C].

Figure 2. Scanned collection of *Plantago australis* subsp. *pretoana* [*A.F.M. Glaziou 8897*, C, holotype].

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